CHAPTER 4

CLIMATE

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THE RELATIONSHIP BETWEEN climate, human landuse and economy has frequently given rise to debate among social scientists. Two basic approaches have been used in evaluating the influence of climate and climatic change. The first focuses on long-term changes, studying the economic, geographic and social effects of the gradual warming and cooling of the earth's surface. Some have argued that these changes have determined social changes. The second approach challenges the role of climate as an agent for social change. Its proponents argue that societies and economies have shown a capacity to adapt to gradual climatic changes and that the significance of climate in history lies more in short-term weather fluctuations ('shocks') like droughts and floods, and society's capacity to cope with them. Both approaches have their uses.

In this chapter, two quite different types of climatic data are presented. The first table provides a synopsis of climatic change in Australia prior to European settlement. Later tables provide selected climatic data after 1788 and document the 'shocks'.

Today, we take in climatic data as a matter of course. Weather maps are familiar through television and newspapers and weather reports are issued regularly by radio stations. The reports and maps are the result of increasingly sophisticated technology. Where no records exist, past climates are reconstructed by examining their impact on the landscape; the type of climate existing 10 000 years ago, for instance, can be inferred from proxy data. The first table, which describes Australia's climate over the last 20 000 years, is based on a variety of such sources: analysis of swamp and lake sediments; pollen analysis, which indicates the type of vegetation growing at a particular period, which in turn indicates whether the climate was humid or dry; analysis of lake-dwelling micro-organisms, whose sensitivity to changes in salinity or lake water levels provide a measure of the amount of precipitation received in the region; evidence of sand-dune activity in the past, which indicates aridity; the distribution of glacial and periglacial features, which indicate colder periods in the past; and for the most recent past, analysis of tree rings, which indicate periods of dry and wet.

Such data have two major limitations. Firstly, most of these reconstruction methods are prone to the statistical errors normally associated with dating procedures used on materials thousands of years old. They are also insensitive to seasonal, annual and other short-term climatic influences (with the exception of tree-ring analysis for the immediate past). They provide a broad, general picture only. Secondly, the geographical coverage of such data is limited, especially with the

analysis of sedimentary deposits, which are generally restricted to the more humid areas of Australia.

Interest in the written record of climatic data goes back to the earliest days of European settlement. Temperature and rainfall were among the earliest climate factors observed at Sydney Cove. These observations are usually found in the diaries and reminiscences of European settlers. Official records soon followed and can be found in both official publications like the government gazettes and parliamentary papers, and other sources like local newspapers. Many records, however, were taken at one place for a short period of time and then discontinued; this limits their use.

By the second half of the nineteenth century the collection of climatic data had been regularised under the direction of government bodies. Long series of statistics are available on a number of climatic variables for hundreds of stations throughout Australia. The collection of data has increased vastly in both scope and sophistication since then. Methods of recording have improved, the range of data collected has expanded and early warning techniques for climatic phenomena such as cyclones have been developed.

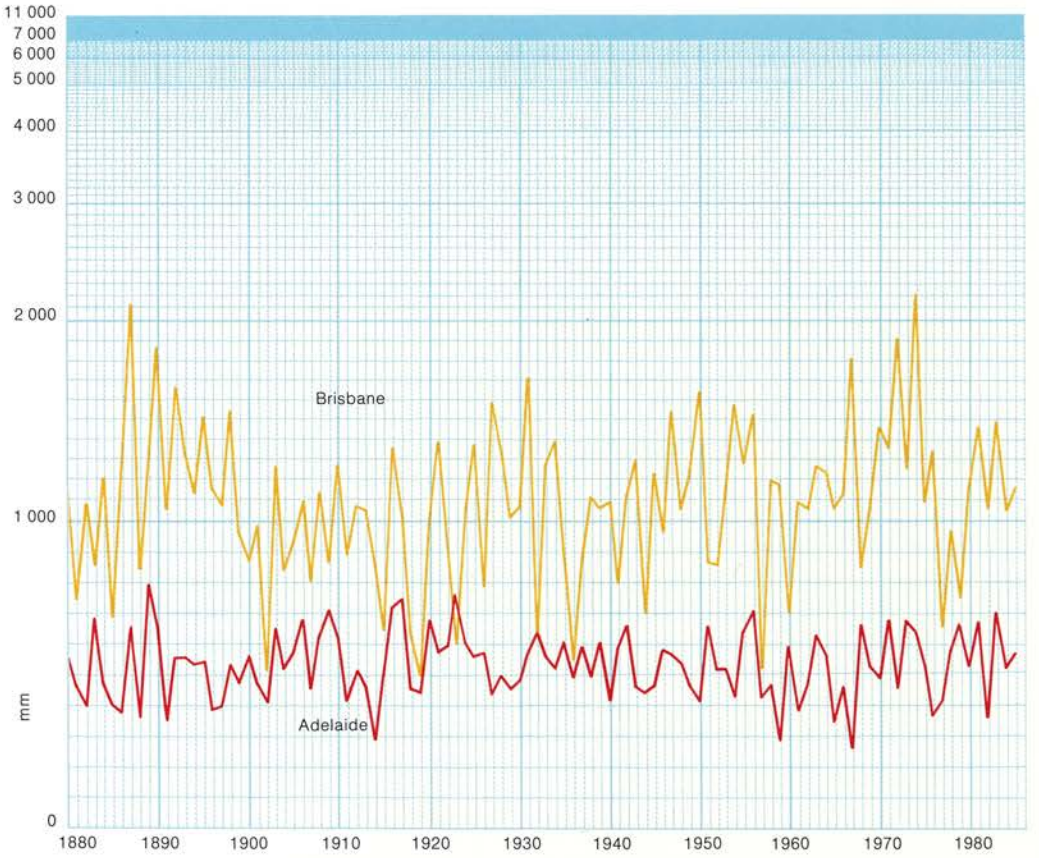
The tables in this chapter present data on temperatures and rainfall, including extremes registered in each state, the mean (average) summer maximum and winter minimum temperatures for the capital cities from 1855, and annual rainfall for the capitals, as well as for a tropical centre (Cairns) and an arid centre (Alice Springs) from 1839.

The tables here are only a sample of what is held by the Commonwealth Bureau of Meteorology, which holds the records of all official stations in Australia. Those interested in the records of their local area may care to consult the Bureau for further information.

CL1 GENERALISED LATE QUATERNARY CLIMATIC CHANGES IN AUSTRALIA

Years before present	*Climatic conditions*	*Nature of evidence*
1 000–0	Slight reduction in precipitation to present-day levels.	Drying and oxidation of peat swamp sediments. Higher salinity levels in enclosed lakes.
2 500–1 000	Increase in effective precipitation, possibly due to a further decrease in temperature.	Marginal expansion of wetter forest types. Surge of growth in peat bogs. Lower salinity levels in enclosed lakes.
3 500–2 500	Reduction in precipitation and probably also in temperature.	Periglacial sediments in high altitude peat bogs. Cessation of peat growth in montane bogs. Increase in open vegetation elements in montane areas. Reduction in flow velocity of streams. Contraction of wetter forest elements. Higher salinity and lower water levels in enclosed lakes. Beginning of phase of dune mobilisation in arid areas.
5 000–3 500	*TRANSITION*	
7 000–5 000	Highest effective precipitation.	Maximum extent of wetter forest types in lowlands. Low salinity and high water levels in enclosed lakes.
9 000– 6 000	'Thermal maximum' — temperatures 1–2°C higher than today. Actual precipitation levels probably also high, but effectively reduced due to high temperatures.	Maximum altitudinal extent of wetter lowland forests.
10 000–9 000	Temperatures and precipitation achieve present-day levels.	Altitudinal tree lines reach present levels. Organic sedimentation commences in many lakes and peat bogs.
15 000–10 000	Gradual, possibly step-by-step increase in temperatures. Effective precipitation possibly lowest for the Late Quaternary; less than half present-day levels in some areas.	Beginning of sedimentation in depressions within previously glaciated areas. Most arid vegetation cover. Lack of swamp growth in lowland sites. Erosion of existing sediments in salt lakes.
17 500–15 000	*TRANSITION*	
20 000–17 500	Height of last glacial period — temperature estimates 6°–10°C lower than today. Limited glaciation in Snowy Mountains and Tasmania. Precipitation levels low.	Maximum extent of ice sheets and glaciers. Low lake levels. Major phase of dune activity. Lack of tree cover throughout most of Australia.

NOTE The Quaternary period is the most recent in geological time; it succeeded the Tertiary period one million years ago.



ANNUAL RAINFALL, BRISBANE AND ADELAIDE, 1880–1985.

CL 2 EXTREME TEMPERATURES, STATE AND TERRITORY MINIMUMS AND MAXIMUMS

	MAXIMUM			MINIMUM		
	Station	*Date*	*°C*	*Station*	*Date*	*°C*
NSW	Bourke	17 Jan 1877	52.8	Charlotte Pass	14 July 1945 22 Aug 1947	-22.2
	Walgett	2 Jan 1903	50.1	Kiandra	2 Aug 1929	-20.6
	Wilcannia	11 Jan 1939	50.0	Cooma	13 July 1898	-11.2
Vic	Mildura	6 Jan 1906	50.8	Mount Hotham	13 Aug 1947	-12.8
	Swan Hill	18 Jan 1906	49.4	Omeo	15 June 1965	-11.7
Qld	Cloncurry	16 Jan 1889	53.1	Stanthorpe	4 July 1895	-11.0
	Winton	14 Dec 1888	50.7	Mitchell	15 Aug 1979	-9.4
	Birdsville	24 Dec 1972	50.0	Nanango	16 July 1918	-9.3
SA	Oodnadatta	2 Jan 1960	50.7	Yongala	20 July 1976	-8.2
	Kyancutta	9 Jan 1939	49.3	Yunta	19 July 1976	-7.7
Tas	Bushy Park	26 Dec 1945	40.8	Shannon	30 June 1983	-13.0
	Hobart	4 Jan 1976	40.8	Butlers Gorge	30 June 1983	-13.0
				Tarraleah	30 June 1983	-13.0
WA	Eucla	22 Jan 1906	50.7	Booylgoo	12 July 1969	-6.7
	Mundrabilla	3 Jan 1979	49.8	Wandering	1 June 1964	-5.7
	Forrest	13 Jan 1979	49.8			
	Madura	7 Jan 1971	49.4			
NT	Finke	2 Jan 1960	48.3	Alice Springs	12 July 1976	-7.5
	Jervois	3 Jan 1978	47.5	Tempe Downs	24 July 1971	-6.9
ACT	Canberra (Acton)	11 Jan 1939	42.8	Canberra	19 July 1924 11 July 1971	-10.0

CL 3 HIGHEST DAILY AND ANNUAL RAINFALL, STATES AND TERRITORIES

	DAILY			ANNUAL		
	Station	*Date*	*Amount*	*Station*	*Year*	*Amount*
			mm			*mm*
NSW	Dorrigo	21 Feb 1954	809	Tallowood Point	1950	4 540
	Cordeaux River	14 Feb 1898	574			
Vic	Balook	18 Feb 1951	275	Mount Buffalo Chalet	1917	3 342
	Hazel Park	1 Dec 1934	267			
Qld	Bellenden Ker (top station)	4 Dec 1979	1140	Bellenden Ker (top station)	1979	11 251
	Crohamhurst	3 Feb 1893	907			
	Finch Hatton	18 Feb 1958	878			
	Mount Dangar	20 Jan 1970	869			
SA	Stansbury	18 Feb 1946	222	Aldgate State School	1917	1 851
	Stirling	17 April 1889	208			
Tas	Cullenswood	22 Mar 1974	352	Lake Margaret	1948	4 504
	Mathinna	5 April 1929	337			
WA	Whim creek	3 April 1898	747	Kamet	1964	2 601
	Kitto	4 Dec 1970	635			
	Fortescue	3 May 1890	593			
NT	Roper Valley	15 April 1963	545	Elizabeth Downs	1973	2 966
	Groote Eylandt	28 Mar 1953	513			

'It doesn't rain nearly so much since they cut all the trees down.' Resident of Innisfail, Queensland.

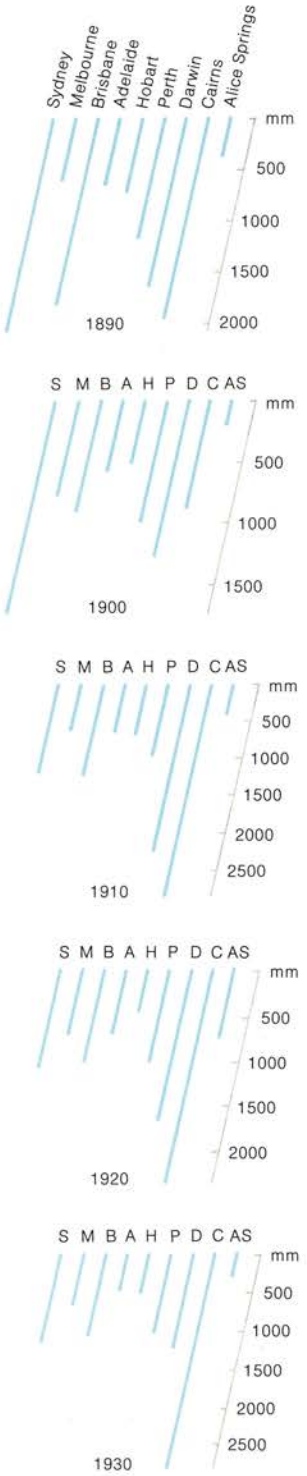
CL 4-17 MEAN SUMMER MAXIMUM AND WINTER MINIMUM TEMPERATURES, AUSTRALIAN CAPITAL CITIES 1855-1984

	SYDNEY		MELBOURNE		BRISBANE		ADELAIDE		HOBART		PERTH		DARWIN	
Year	Summer	Winter	Summer	Winter	Summer	Winter	Summer	Winter	Summer	Winter	Summer	Winter	Spring[a]	Winter
	4	5	6	7	8	9	10	11	12	13	14	15	16	17
	°C	°C	°C	°C	°C	°C	°C	°C	°C	°C	°C	°C	°C	°C
1855	..	..	..	5.9	..	..	..	..	..	..	..	..	..	..
1856	..	..	24.3	6.5	..	..	..	..	..	..	..	..	..	..
1857	..	..	24.5	6.0	..	..	..	7.1	..	..	..	..	..	..
1858	..	..	27.7	5.8	..	..	32.6	6.5	..	..	..	..	..	..
1859	..	7.1	24.7	6.1	..	..	30.0	6.4	..	..	..	..	..	..
1860	25.0	8.4	26.3	5.6	..	..	32.1	7.7	..	..	..	..	..	..
1861	24.7	7.8	24.5	5.8	..	..	29.8	7.8	..	..	..	..	..	..
1862	25.6	7.4	24.9	6.8	..	..	29.6	8.7	..	..	..	..	..	..
1863	25.5	8.6	25.3	5.9	..	..	30.7	8.5	..	..	..	..	..	..
1864	25.2	8.0	23.2	6.2	..	..	29.5	7.5	..	..	..	..	..	..
1865	24.7	7.4	23.5	4.8	..	..	28.9	6.8	..	..	..	..	..	..
1866	25.9	8.7	25.3	5.3	..	..	30.6	8.0	..	..	..	..	..	..
1867	24.8	9.1	24.9	6.5	..	..	30.7	8.7	..	..	..	..	..	..
1868	25.0	8.5	24.1	5.3	..	..	28.0	7.4	..	..	..	..	..	..
1869	26.1	8.4	25.2	5.8	..	..	29.1	7.8	..	..	..	..	..	..
1870	25.4	8.1	26.5	5.7	..	..	30.6	7.9	..	..	..	..	..	..
1871	24.3	7.8	25.3	6.4	..	..	29.5	8.8	..	..	..	..	..	..
1872	26.1	8.1	25.8	6.2	..	..	31.2	7.2	..	..	..	..	..	..
1873	24.7	9.3	24.8	6.5	..	..	28.3	7.7	..	..	..	..	..	..
1874	25.1	7.5	26.0	5.0	..	..	29.9	7.1	..	..	..	..	..	..
1875	25.6	8.9	25.3	6.2	..	..	29.2	7.8	..	..	..	..	..	..
1876	26.0	8.5	24.7	5.3	..	..	27.5	6.2	..	..	..	..	..	..
1877	25.6	9.1	24.9	5.8	..	..	30.7	8.0	..	..	..	..	..	..
1878	25.9	7.9	24.7	6.3	..	..	29.8	7.7	..	..	..	..	..	..
1879	25.0	8.3	25.2	5.5	..	..	30.4	7.6	..	..	..	..	..	..
1880	24.5	7.8	25.1	6.3	..	..	31.3	7.9	..	..	..	..	..	..
1881	24.7	7.8	24.9	5.9	..	..	29.0	7.1	..	..	..	..	..	..
1882	25.4	8.5	24.9	5.9	..	..	29.9	6.6	..	2.8	..	..	35.2	19.5
1883	24.9	8.2	25.4	6.7	..	..	29.1	7.8	21.3	6.0	..	..	34.9	20.7
1884	26.1	9.2	23.5	6.1	..	..	28.1	7.7	20.4	4.9	..	..	34.3	19.7
1885	26.2	8.9	24.1	5.8	..	..	27.0	7.6	20.1	3.9	..	..	34.0	19.6
1886	26.2	9.1	24.2	5.2	..	..	29.4	7.7	20.5	4.0	..	..	34.8	20.7
1887	25.0	9.1	25.2	6.4	..	9.6	28.4	7.9	22.0	4.7	..	..	34.2	19.0
1888	24.7	8.5	24.2	6.0	28.0	9.3	28.6	8.1	22.4	4.3	..	..	34.9	20.7
1889	25.4	9.5	25.3	6.4	30.5	10.8	29.5	7.6	21.5	4.8	..	..	35.2	20.9
1890	25.2	9.0	26.8	6.5	28.6	9.4	29.5	7.8	22.0	6.2	..	..	34.3	19.9
1891	25.0	9.3	23.4	7.1	28.9	9.4	27.0	7.1	20.1	5.1	..	..	34.0	18.0
1892	25.8	8.4	24.1	6.2	29.9	9.8	27.2	7.5	..	..	..	..	35.1	21.6
1893	24.1	8.9	23.8	6.1	28.8	10.3	27.4	7.4	14.0	5.5	..	..	34.8	20.1
1894	25.3	8.4	25.3	6.6	29.3	8.7	28.1	8.2	20.7	6.0	..	..	33.0	19.2
1895	24.3	8.0	25.6	6.1	28.4	8.1	28.6	7.9	23.2	4.6	..	..	33.2	20.9
1896	27.1	7.8	25.4	5.8	29.5	8.1	28.3	6.4	20.7	4.4	..	..	33.6	19.1
1897	25.6	9.4	24.2	6.2	29.2	11.3	27.5	8.2	21.4	4.3	..	8.9	34.2	21.7
1898	25.4	8.7	28.3	6.6	27.8	10.0	31.2	8.2	22.6	5.4	28.6	9.1	33.8	20.7
1899	24.9	9.0	25.5	5.3	29.2	10.0	29.5	7.0	21.4	4.1	28.6	9.0	34.0	19.3
1900	26.3	8.7	26.5	6.0	29.1	9.8	29.7	7.6	22.6	4.6	28.9	9.7	34.6	21.7
1901	25.3	7.5	25.4	5.3	30.2	9.2	29.7	7.0	21.1	4.6	28.3	8.6	34.0	20.2
1902	25.7	8.5	24.6	5.2	30.9	9.9	29.1	7.8	20.4	3.7	26.4	8.3	33.4	20.9
1903	26.0	8.4	24.7	5.5	31.6	9.9	27.6	7.6	21.5	4.5	28.1	9.3	33.9	20.8
1904	24.7	8.0	23.2	6.6	30.4	8.8	27.0	8.0	21.2	3.9	29.0	9.2	33.9	19.9
1905	26.1	7.9	26.0	6.8	29.5	8.6	28.9	7.8	22.0	4.9	27.7	8.3	34.1	20.9
1906	24.9	8.8	25.7	7.0	29.2	9.9	31.4	8.8	21.5	5.2	28.3	9.3	33.0	22.0
1907	25.3	8.4	24.2	5.8	29.1	9.4	28.9	7.9	20.8	4.9	29.9	10.2	34.0	21.1
1908	26.3	7.4	27.0	5.2	29.3	8.9	30.3	6.5	22.1	4.7	27.5	7.6	34.1	20.6
1909	25.8	8.1	25.1	6.2	29.9	10.6	29.2	7.5	19.9	4.5	29.8	8.5	33.6	21.6
1910	26.0	9.1	25.8	7.1	29.5	10.6	29.4	8.6	21.1	5.3	30.4	9.5	33.9	21.6
1911	25.2	8.4	24.3	6.5	29.1	9.1	26.2	8.1	21.1	4.8	28.3	8.4	33.4	19.6
1912	26.4	8.8	24.9	6.4	32.1	11.1	28.4	8.0	21.0	5.1	28.2	9.5	33.8	20.8
1913	26.3	8.8	24.3	6.8	29.4	9.7	27.7	7.3	21.3	4.9	28.5	9.2	33.7	19.6
1914	26.0	9.4	26.7	6.3	30.3	10.6	29.5	8.0	21.4	5.3	27.6	8.8	33.2	19.5
1915	26.9	8.9	24.8	7.7	30.2	9.9	29.3	8.9	20.3	5.2	29.2	10.5	34.2	21.9
1916	25.3	9.4	24.6	6.2	29.8	10.3	29.1	8.1	20.7	4.8	28.7	8.7	33.7	22.5
1917	25.6	8.8	24.1	6.9	28.8	9.6	27.1	8.4	20.1	5.4	28.2	9.2	33.6	21.6
1918	24.9	8.1	26.0	7.1	28.1	8.8	29.3	7.9	21.5	5.3	28.5	9.6	33.8	20.4
1919	26.9	8.5	25.9	6.1	30.2	10.2	29.0	8.4	21.1	5.3	27.6	9.5	33.1	19.4
1920	25.2	8.4	25.0	6.6	28.5	10.5	29.0	8.2	21.5	5.4	28.6	8.9	33.7	23.0
1921	25.3	8.8	26.5	6.9	29.2	11.7	29.8	8.0	21.8	5.7	30.2	10.5	34.0	21.2
1922	25.3	8.4	24.8	5.7	29.1	9.6	27.7	7.5	20.4	5.1	28.7	8.8	33.7	19.3
1923	26.8	9.0	25.0	7.1	30.2	9.8	28.2	8.3	20.3	5.5	27.3	9.5	33.4	19.1
1924	26.9	8.4	23.7	6.1	30.4	11.0	26.7	7.6	19.4	4.8	28.0	9.0	33.9	20.7

CL 4–17 continued

Year	SYDNEY		MELBOURNE		BRISBANE		ADELAIDE		HOBART		PERTH		DARWIN	
	Summer	*Winter*	*Summer*	*Winter*	*Summer*	*Winter*	*Summer*	*Winter*	*Summer*	*Winter*	*Summer*	*Winter*	*Spring*[a]	*Winter*
	4	*5*	*6*	*7*	*8*	*9*	*10*	*11*	*12*	*13*	*14*	*15*	*16*	*17*
	°C	°C	°C	°C	°C	°C	°C	°C	°C	°C	°C	°C	°C	°C
1925	24.4	8.5	24.1	5.7	28.4	9.8	27.1	7.5	19.8	4.3	28.2	8.3	33.5	19.6
1926	26.7	9.0	24.7	7.2	30.0	10.5	28.4	8.2	21.1	6.2	28.4	9.7	34.6	20.4
1927	24.7	7.4	25.9	5.9	28.2	9.0	27.1	7.8	21.1	4.7	28.3	9.2	34.0	20.6
1928	25.2	9.5	25.5	6.2	27.6	9.9	27.0	8.0	21.7	5.8	29.7	9.9	34.1	20.1
1929	25.4	7.7	26.0	5.8	29.9	9.0	28.6	7.3	21.3	4.2	28.5	8.9	33.7	19.5
1930	25.6	9.6	25.2	6.7	29.0	11.1	28.0	8.3	20.1	5.4	28.9	10.4	33.2	20.4
1931	25.3	8.5	24.3	6.6	29.7	10.9	27.2	7.9	20.5	5.2	28.0	8.8	33.1	21.4
1932	24.8	7.8	24.9	5.9	29.9	9.9	29.0	8.0	20.7	5.0	31.4	9.2	33.6	20.1
1933	24.9	8.4	24.1	5.7	29.6	10.1	26.7	7.5	19.4	4.8	29.4	9.5	33.3	20.7
1934	25.0	8.9	25.0	5.9	28.0	10.1	28.7	8.5	21.2	4.8	30.4	9.0	33.1	20.7
1935	24.7	8.0	24.2	6.5	29.5	9.7	27.0	8.2	20.0	5.4	28.5	9.0	33.1	20.1
1936	24.0	8.6	25.9	6.5	28.9	10.4	27.6	8.1	20.9	5.0	27.8	9.7	21.9	21.6
1937	25.7	8.5	24.8	5.2	29.5	10.5	26.7	7.7	19.5	4.8	29.1	8.6	33.4	20.5
1938	25.9	7.7	25.7	5.7	29.5	10.3	26.4	7.7	20.6	4.8	27.8	9.4	32.6	21.6
1939	26.5	8.2	26.2	6.1	29.6	10.1	30.4	8.2	21.0	5.4	27.8	9.2	32.5	21.0
1940	26.5	8.5	24.6	6.3	29.5	10.0	26.2	7.9	20.5	4.8	29.9	9.6	32.5	20.4
1941	24.9	8.3	25.1	6.8	27.8	9.7	27.0	8.8	21.0	4.3	28.9	10.4	32.3	21.5
1942	25.5	9.2	25.6	6.6	29.1	11.8	28.3	8.6	21.2	5.0	29.4	9.2	33.6	19.4
1943	25.6	7.4	25.7	5.3	28.1	9.2	29.3	7.4	21.2	3.9	28.4	8.1	31.7	19.7
1944	25.3	8.1	25.2	5.1	28.7	10.8	27.8	7.0	20.4	4.3	29.4	9.6	20.6	19.2
1945	25.2	9.4	24.6	6.3	29.8	11.2	26.5	8.1	20.6	4.7	28.3	10.1	32.3	20.2
1946	26.1	8.6	25.6	6.6	28.9	8.6	27.9	7.6	21.8	5.1	27.6	9.2	32.4	19.9
1947	25.3	8.5	26.7	6.5	28.9	9.5	28.4	8.4	21.7	4.8	28.4	9.7	32.5	21.2
1948	24.6	8.1	25.1	5.7	28.1	10.1	27.4	7.9	21.1	4.5	28.6	9.8	32.6	19.9
1949	24.8	8.4	24.6	5.6	29.1	9.3	25.8	7.3	19.9	4.8	29.0	10.7	32.2	18.1
1950	25.1	10.2	23.6	5.7	28.5	12.1	26.8	7.9	20.1	4.3	30.1	9.4	32.0	19.9
1951	24.7	9.1	28.4	6.7	27.2	10.0	30.2	8.1	22.6	4.5	27.1	8.4	33.0	20.6
1952	25.5	9.4	24.7	6.3	29.6	11.3	27.1	7.2	20.0	4.7	28.3	9.1	32.9	20.0
1953	24.0	8.5	25.0	6.8	28.4	9.5	27.1	8.1	21.3	4.1	27.6	9.1	33.0	19.7
1954	25.6	8.9	25.3	6.8	28.5	11.4	26.5	7.9	20.6	4.9	28.9	9.0	32.4	19.8
1955	25.2	9.0	26.2	6.6	28.7	10.5	28.5	8.7	21.0	4.8	29.5	8.7	32.6	21.9
1956	24.7	8.6	25.5	6.2	28.8	9.7	27.2	8.1	21.2	4.8	30.2	8.0	32.5	20.7
1957	24.8	9.1	25.0	6.8	29.0	10.7	26.3	8.7	20.9	4.7	28.8	9.4	32.9	20.8
1958	26.1	9.8	24.5	6.5	29.7	11.6	27.7	7.7	20.4	4.8	30.1	8.8	33.4	21.2
1959	25.2	9.2	25.6	6.6	28.6	10.9	27.6	8.6	21.5	5.0	30.0	10.7	33.0	19.4
1960	26.4	8.8	25.9	5.7	29.4	9.6	26.6	7.2	22.1	4.7	27.6	8.2	33.0	19.0
1961	24.7	8.9	27.7	7.3	27.5	10.2	29.5	8.3	22.5	5.4	31.0	9.3	32.7	18.7
1962	25.4	9.3	26.4	7.0	28.9	10.4	28.1	9.4	21.7	5.4	31.3	9.6	33.2	20.9
1963	25.4	9.1	25.3	6.3	28.3	10.8	26.6	8.4	21.2	4.1	30.0	10.0	32.8	18.6
1964	26.3	9.3	25.0	7.8	28.7	10.3	26.5	8.6	20.3	5.0	29.1	11.1	32.8	19.6
1965	24.7	9.0	23.7	6.7	29.1	10.6	25.7	8.4	19.3	5.0	28.9	9.9	33.0	18.5
1966	25.0	8.5	25.2	6.1	28.5	10.8	28.5	8.3	20.7	4.5	29.0	9.3	32.7	19.9
1967	25.4	10.0	24.8	6.6	28.4	11.3	26.3	8.3	21.2	4.7	29.6	9.9	33.4	18.2
1968	25.6	8.5	26.5	6.9	28.2	10.4	26.5	7.9	21.1	4.9	28.6	9.1	33.2	20.1
1969	25.6	9.6	25.7	6.7	29.6	12.0	27.0	9.0	21.0	5.3	28.3	9.2	33.1	20.2
1970	26.3	8.1	24.3	7.4	29.8	9.9	25.8	8.5	19.7	5.5	29.3	10.6	33.4	19.8
1971	25.7	8.4	26.0	6.7	28.6	10.5	27.4	8.5	21.3	4.4	29.0	9.5	33.4	19.5
1972	24.8	9.3	25.5	6.5	27.7	10.7	26.4	8.6	21.6	5.1	30.0	9.9	33.4	20.1
1973	26.8	10.0	26.1	6.4	29.5	12.7	28.0	8.7	22.5	4.2	30.1	10.0	33.5	21.6
1974	25.7	9.1	26.5	7.4	28.5	10.5	27.9	9.1	22.0	5.5	30.4	10.3	32.8	19.4
1975	25.8	9.5	24.6	7.6	29.2	11.5	26.6	8.7	21.2	5.8	30.0	10.0	33.1	20.5
1976	25.7	9.2	25.4	7.0	28.1	11.4	28.0	8.5	21.9	4.8	30.7	10.5	33.6	18.6
1977	27.1	8.7	25.5	7.1	30.4	10.7	27.8	9.1	21.2	4.9	29.7	10.9	32.9	18.5
1978	27.2	8.8	24.1	7.1	30.1	11.3	26.9	8.1	20.9	4.9	32.0	9.6	32.7	21.0
1979	26.0	9.1	25.3	7.5	29.2	11.6	29.1	8.5	21.7	5.3	29.8	9.5	33.7	20.0
1980	27.2	9.4	25.0	7.9	30.9	11.8	27.2	8.3	20.6	6.4	30.7	10.4	33.1	20.8
1981	26.2	9.1	28.0	7.4	29.0	11.1	30.4	8.1	22.4	5.3	29.2	9.9	32.9	22.1
1982	26.2	8.8	25.7	6.1	29.9	10.5	29.2	6.4	21.8	4.9	28.5	9.6	32.3	19.8
1983	26.4	8.9	25.5	7.4	29.4	12.1	29.3	7.3	21.4	5.1	28.6	11.0	33.0	20.2
1984	25.7	..	24.6	..	28.5	..	28.3	..	21.5	..	29.8	..	..	..

(a) The spring temperature has been provided for Darwin as generally it was higher than the summer one.



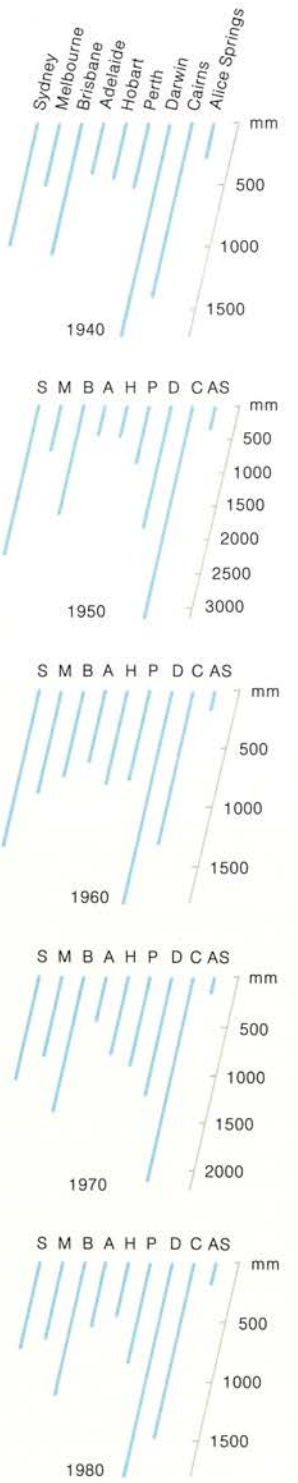
ANNUAL RAINFALL IN SELECTED CITIES, 1890–1930

CL 18-26 ANNUAL RAINFALL, AUSTRALIAN CITIES 1839–1985

Year	Sydney	Melbourne	Brisbane	Adelaide	Hobart	Perth	Darwin	Cairns	Alice Springs
	18	19	20	21	22	23	24	25	26
	mm	mm	mm	mm	mm	mm	mm	mm	mm
1839	..	..	..	505	..	..	..	..	..
1840	..	..	747	616	..	..	..	..	..
1841	..	..	1253	457	..	..	..	..	..
1842	..	..	732	516	..	..	..	..	..
1843	..	..	1315	435	..	..	..	..	..
1844	..	..	1606	432	..	..	..	..	..
1845	..	..	993	479	..	..	..	..	..
1846	..	..	798	650	..	..	..	..	..
1847	..	..	..	700	..	..	..	..	..
1848	..	..	1106	602	..	..	..	..	..
1849	..	..	..	647	..	..	..	..	..
1850	..	..	..	495	369	..	..	..	..
1851	..	..	..	786	457	..	..	..	..
1852	..	..	..	698	600	..	..	..	..
1853	..	..	..	690	369	..	..	..	..
1854	..	..	..	390	776	..	..	..	..
1855	..	..	..	589	..	..	..	..	..
1856	..	756	..	634	..	..	..	..	..
1857	..	735	..	565	..	..	..	..	..
1858	..	663	..	548	..	..	..	..	..
1859	1071	556	..	378	..	..	..	..	..
1860	2111	646	1393	501	..	..	..	..	..
1861	1485	742	1766	601	..	..	..	..	..
1862	609	562	719	556	..	..	..	..	..
1863	1196	926	1752	604	..	..	..	..	..
1864	1756	698	1169	504	..	..	..	..	..
1865	922	405	612	395	..	..	..	..	..
1866	938	570	1300	512	..	..	..	..	..
1867	1513	656	1548	489	..	..	..	..	..
1868	1091	465	914	508	..	..	..	..	..
1869	1220	626	1362	377	..	..	..	..	..
1870	1630	859	2059	606	..	..	1769	..	..
1871	1327	768	1225	592	..	..	2034	..	..
1872	941	827	1270	577	..	..	1394	..	..
1873	1860	652	1525	536	..	..	1849	..	..
1874	1615	722	980	438	..	..	1317	..	234
1875	1175	836	1707	743	..	..	1431	..	429
1876	1160	613	1358	343	..	730	1524	..	159
1877	1518	613	770	634	..	730	1538	..	518
1878	1265	645	1432	562	..	1009	1572	..	276
1879	1604	489	1712	527	..	1050	1760	..	694
1880	749	725	1264	572	..	808	1711	..	167
1881	1045	614	748	459	..	630	1162	..	169
1882	1072	569	1086	402	780	925	1816	..	271
1883	1194	604	857	683	611	1007	1461	1835	146
1884	1120	658	1200	478	548	812	1557	1917	137
1885	1014	685	688	406	719	850	2076	2748	437
1886	999	611	1363	369	543	734	1352	4434	298
1887	1529	824	2112	653	615	954	1702	2309	264
1888	583	469	841	371	469	708	1555	2061	256
1889	1453	717	1255	786	782	1016	1333	3148	174
1890	2071	617	1856	657	699	1188	1669	1966	366
1891	1428	680	1059	352	591	771	1890	2489	265
1892	1740	636	1652	548	473	794	1078	1638	214
1893	1192	683	1319	546	699	1019	1589	1276	155
1894	971	576	1119	529	697	602	1538	3042	506
1895	812	435	1502	541	649	839	2003	1979	361
1896	1077	641	1143	386	551	800	1711	2394	265
1897	1063	658	1081	394	521	690	1879	1685	145
1898	1099	397	1526	529	512	808	1472	2112	260
1899	1421	734	950	480	527	824	1505	2233	166
1900	1691	715	875	553	487	931	1223	849	147
1901	1019	698	978	459	603	934	1471	2204	196
1902	1096	589	412	410	556	688	1241	1279	138
1903	980	723	1253	647	658	908	1363	2542	405
1904	1164	756	845	518	569	873	1935	1591	335
1905	889	653	933	568	816	880	1378	1530	244
1906	809	567	1090	674	595	823	1032	2111	305
1907	795	567	798	454	660	1008	1527	2179	249
1908	1159	452	1120	624	421	776	1566	2132	448
1909	823	658	866	704	694	994	1504	2750	206
1910	1194	627	1246	626	643	940	2217	2928	465
1911	1273	931	894	409	684	595	1070	2835	180
1912	1207	519	1049	498	591	708	1648	1620	222

CL 18–26 continued

Year	Sydney	Melbourne	Brisbane	Adelaide	Hobart	Perth	Darwin	Cairns	Alice Springs
	18	19	20	21	22	23	24	25	26
	mm	mm	mm	mm	mm	mm	mm	mm	mm
1913	1467	540	1037	462	494	973	1104	2674	221
1914	1433	473	864	291	394	514	1478	2321	268
1915	886	533	653	492	534	1109	1713	1120	113
1916	1110	968	1342	716	1104	894	1549	2567	346
1917	1332	778	1040	736	780	1161	2195	1697	230
1918	1092	691	635	443	665	1006	1531	1757	107
1919	1490	634	491	438	575	780	1428	1460	297
1920	1105	720	1009	679	461	1026	1685	2396	726
1921	1102	757	1382	576	466	1044	1445	3186	538
1922	1000	637	911	590	722	809	1889	1650	325
1923	941	576	593	757	840	1130	1720	1356	370
1924	941	928	1047	597	733	859	1215	2431	137
1925	1280	448	1350	558	579	799	1646	1945	233
1926	943	522	784	564	658	1251	1284	1517	215
1927	1234	458	1578	430	514	930	1142	2291	200
1928	1019	614	1338	494	770	1141	1081	1584	61
1929	1472	733	1010	446	677	934	1811	2598	143
1930	1131	647	1048	474	494	1007	1224	2734	281
1931	1251	729	1695	566	693	998	1524	2510	160
1932	953	791	630	636	771	1001	1724	2486	237
1933	1086	567	1263	563	592	825	1707	2750	257
1934	1651	853	1378	515	591	1032	1356	2474	152
1935	788	763	881	597	821	821	1541	2033	156
1936	770	619	553	492	501	779	1274	2471	265
1937	1323	546	885	585	527	897	1054	1335	230
1938	997	449	1105	490	796	753	1486	1453	216
1939	857	842	1052	593	694	1161	1471	2994	419
1940	1001	505	1077	411	437	509	1730	1412	272
1941	680	809	801	574	598	883	1567	2670	264
1942	1245	758	1118	647	495	995	1687	1949	246
1943	1290	478	1288	454	532	799	1566	1517	263
1944	787	543	707	436	668	697	1559	1686	305
1945	1177	490	1224	454	432	1339	1716	2354	270
1946	916	758	983	575	1004	1054	1025	1308	299
1947	1040	775	1532	559	983	1104	1672	1666	487
1948	987	534	1056	544	597	883	1304	1818	270
1949	1685	799	1199	464	582	690	1681	2327	331
1950	2194	667	1624	409	490	821	1809	3198	383
1951	1352	760	861	647	626	868	1152	1309	154
1952	1505	875	851	509	800	999	1104	1820	263
1953	1039	722	1108	509	768	944	1698	1779	352
1954	1050	853	1560	427	692	713	1893	1804	250
1955	1843	781	1281	625	569	1182	1736	2727	268
1956	1711	787	1504	692	933	949	2307	1976	330
1957	691	530	524	426	729	849	1884	2269	318
1958	1505	687	1185	447	929	816	1077	2090	186
1959	1517	657	1165	288	491	617	1552	2732	176
1960	1297	852	709	587	748	717	1756	1263	157
1961	1452	562	1075	380	460	820	1121	1183	113
1962	1141	587	1052	458	646	731	1622	1859	258
1963	2036	739	1248	621	395	995	1334	2240	117
1964	1101	707	1225	557	714	976	1704	2615	121
1965	915	591	1043	340	535	1042	1554	2031	81
1966	1230	682	1114	496	700	774	1370	928	338
1967	1342	332	1799	258	491	1038	1627	1425	234
1968	625	533	852	655	476	931	2121	1912	502
1969	1447	626	1046	526	723	574	1947	1938	206
1970	1104	804	1440	484	783	909	1224	2091	172
1971	1109	780	1375	673	754	799	1973	1912	153
1972	1282	567	1890	447	452	611	1492	2780	291
1973	1493	818	1262	677	605	974	1667	2852	513
1974	1602	804	2194	639	1020	938	2644	2499	903
1975	1293	710	1091	523	828	682	1910	2428	684
1976	1783	504	1312	366	665	713	1563	2000	552
1977	923	605	660	400	495	607	1473	2784	372
1978	1499	867	965	574	608	923	1734	1425	429
1979	811	543	748	660	390	560	1197	1636	308
1980	736	644	1136	527	465	844	1845	1472	169
1981	1038	602	1452	671	548	849	2164	1518	310
1982	838	422	1042	357	398	818	1495	1445	294
1983	1346	612	1473	692	598	823	1886	1822	549
1984	1801	565	1040	518	595	827	1949	1752	289
1985	1217	678	1141	561	716	691	1234	2490	121



ANNUAL RAINFALL IN SELECTED CITIES, AUSTRALIA, 1940–1980